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Research Article

Association Between Injurious Site and Demographic Features of Injured Civilians During Sudan War 2023 to 2024

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Abstract

Background: War has far-reaching consequences for individuals, communities, governments, and even global systems. Civilians in Sudan have suffered serious and frequently targeted wounds and other suffering during the war. A collapsed health system, a lack of medical supplies, and purposeful attacks on healthcare facilities make it impossible for wounded individuals to receive care. As a result, the purpose of this study was to determine the relationship between the injurious site and the demographic characteristics of injured people during the Sudan war of 2023–2024. Methodology: This is a prospective descriptive analysis conducted at El-Obeid Teaching Hospital from May 2023 to May 2024. The study encompassed all civilian casualties resulting from the armed conflict who were admitted to El-Obeid Teaching Hospital in El-Obeid, North Kordofan State, Sudan. Results: The majority of participants were aged 18-24 years, followed by those under 18 and aged 25-34 years, accounting for 26%, 20.5%, and 17.5%, respectively. In terms of occupation, the majority of the wounded were self-employed, comprising 48.5%, followed by students at 13% and pupils at 10.5%. The most prevalent sites are the lower limbs, followed by the upper limbs, abdomen, and chest, comprising 46.5%, 25.5%, 25.5%, and 19%, respectively. Conclusion: The primary body sites impacted

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during armed conflict include the lower and upper extremities, as well as the abdomen. Individuals engaged in outdoor occupations and students experience the highest rates of injury.

Keywords

Sudan, War, Civilian Victims, El-Obeid, Armed Conflict

1. Introduction

Armed conflict increasingly contributes to global mortality, representing a substantial threat to the resilience of health systems worldwide [1]. Civilians experience a considerable burden of morbidity and mortality in contemporary armed conflicts, especially when explosive weapons are deployed in densely populated regions [2]. Approximately 90% of fatalities related to injuries take place in low- and middle-income nations. Injury death rates are elevated in low-income countries compared to high-income countries. Individuals from lower economic backgrounds experience higher rates of both fatal and non-fatal injuries compared to those from higher economic backgrounds, even within the same country. This is applicable even in high-income nations. The disproportionate occurrence of injuries among disadvantaged populations is associated with various risk factors. These factors encompass living, working, traveling, and attending school under precarious conditions; a diminished emphasis on preventive measures in disadvantaged communities; and inadequate access to quality trauma care in emergencies and rehabilitation services [3].

The civilian population in Sudan has suffered significantly due to prolonged conflicts, including civil wars from 1956 to 1972 and from 1983 to 2005, with ongoing hostilities in certain regions to the present day [4]. The conflict in Sudan, initiated in April 2023 between the Sudanese Armed Forces and the Rapid Support Forces, has led to considerable casualties and humanitarian crises. Fatality estimates differ significantly, with reports suggesting thousands of deaths and a considerable number of injuries [5]. This study aims to investigate the relationship between injury sites and the demographic characteristics of civilians injured during the Sudan war from 2023 to 2024.

2. Materials and Methods

This is a prospective descriptive analysis conducted at El-Obeid Teaching Hospital from May 2023 to May 2024. The study encompassed all civilian casualties resulting from the armed conflict who arrived at El-Obeid Teaching Hospital in El-Obeid, North Kordofan State, Sudan. All injured individuals were included irrespective of age, gender, or other demographic attributes. Military personnel had been excluded. Information pertaining to each participant was acquired from hospital records.

3. Data Analysis

The data pertinent to this study was first organized in a data sheet and subsequently input into a statistical package for Social Sciences (SPSS). Frequencies, percentages, means, and cross-tabulations were collected. The chi-square test was calculated with a 95% confidence interval in mind. A P-value of less than 0.05 was deemed to be statistically significant.

4. Results

This study included 200 participants (169 (84.5%) males and 31 (15.5%) females) ranging in age from 1 to 75 years, with a mean age of 30 years. The majority of participants were between 18 and 24 years old, followed by those under 18 and between 25 and 34 years old (52/200, 26%), 41 (20.5%), and 35 (17.5%), respectively. In terms of occupation, the majority of those injured were self-employed, followed by students and pupils, who accounted for 97/200 (48.5%), 26/200 (13%), and 21/200 (10.5%). As seen in Table 1 and Figure 1, approximately 123/200 (61.5%) of the wounded were from metropolitan regions, with the remaining 74/200 (38.4%) from rural areas.

Table 1. *Distribution of the study subjects by gender, age, and occupation.*

Variable	Males n= 169	Females n=31	Total n=200
Age			
<18 years	34	8	42
18-24	47	5	52
25-34	29	6	35
35-44	31	4	35
45+	28	8	36
Total	169	31	200
Occupation			
Pupils	15	6	21
Students	22	4	26
Farmers	9	0	9

Variable	Males n= 169	Females n=31	Total n=200
Teachers	3	0	3
Self-employed	88	9	97
Housewives	0	11	11
Drivers	11	0	11
Jobless	8	1	9
Others	7	0	7
Total	163	31	194
Residence			
Rural	68	6	74
Urban	98	25	123
Total	166	31	197

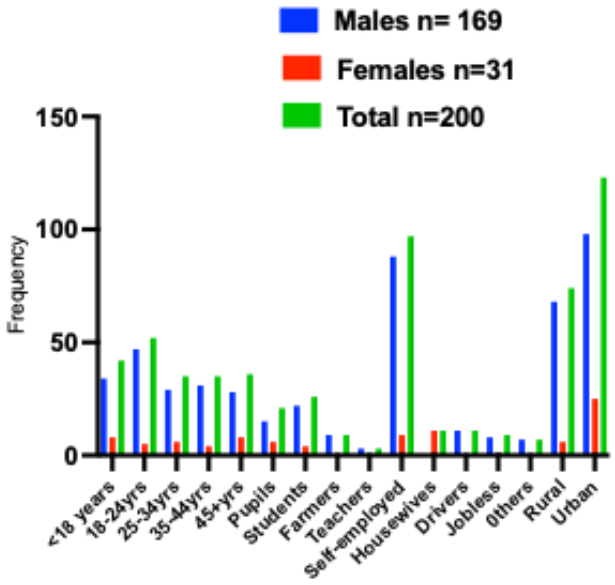

Figure 1. *Description of the study subjects by gender, age, and occupation.*

Table 2 and Figure 2 summarized the distribution of wounded people by gender and injury site. Lower limbs were the most prevalent place, followed by upper limbs, abdomen, and chest, which accounted for 93/200 (46.5%), 51 (25.5%), 48 (25.5%), and 38 (19%), respectively.

Table 2. *Distribution of the study subjects by gender and site of injury.*

Variable	Males	Females	Total
Head	4	2	6
Neck	3	3	6
Chest	31	7	38
Abdomen	38	10	48
Perineum	2	2	4
Spine	2	1	3
Upper limbs	43	8	51
Lower limbs	82	11	93
Back	4	0	4
Testis	1	0	1
Eye	1	0	1
eye teeth	1	0	1
Face	0	1	1
Gluteal	2	2	4
Jaw	1	0	1
Pelvis	2	0	2
Rectal	0	1	1
Right loin	2	0	2
scrotum penis	1	0	1

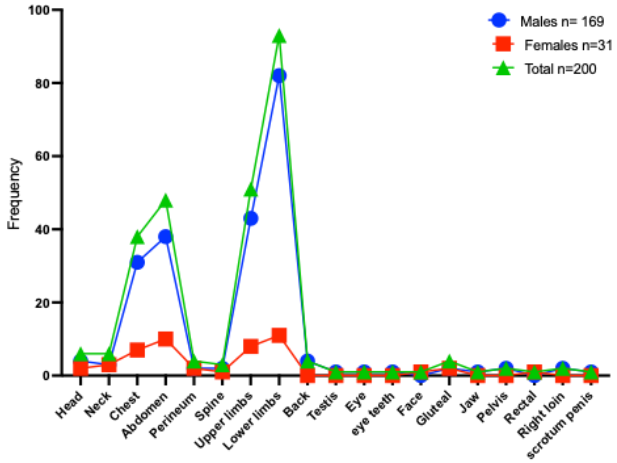

Figure 2. *Description of the study subjects by gender and site of injury.*

Table 3 and Figure 3 summarized the study subjects' distribution by gender, status at presentation, mode of wound, and kind of weapon. The majority of victims reported being shocked, followed by stable, accounting for 117/200 (58.5%) and 80 (40%), respectively. The majority of wounds were penetrating (185/200, or 92.5%). Approximately 161 (80.5%) people arrived with gunshot wounds, and 38 (19%) with bomblets.

Table 3. *Distribution of the study subjects by gender, status at presentation, mode of wound, and type of weapon.*

Variable	Males	Females	Total
Status at presentation			
Stable	67	13	80
Shocked	99	18	117
Others	3	0	3
Total	169	31	200
Mode of wounds			
Penetrating	157	28	185
Non penetrating	11	3	14
Total	168	31	199
Type of weapon			
Bomblets	29	9	38
Gunshot	140	21	161
Splash	0	1	1

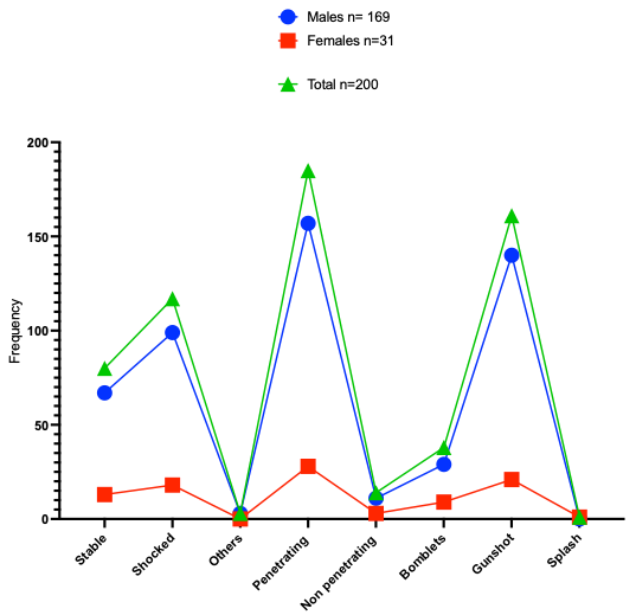

Figure 3. *Distribution of the study subjects by gender, status at presentation, mode of wound, and type of weapon.*

The distribution of damaged sites by age exhibited varied variances, as shown in Table 4. The majority of patients were under 18 years old, with 20/93 (21.5%), 13/51 (25.5%), 13/48 (27%), 9/38 (23.7%), and 4/6 (66.7%) for lower limb, upper limb, abdomen, chest, and head injuries, respectively.

Table 4. *Distribution of the injured site by age.*

Variable	<18 years	18-24	25-34	35-44	45+	Total
Head	4	0	1	0	1	6
Neck	2	0	2	1	1	6
Chest	9	9	7	8	5	38
Abdomen	13	12	7	7	9	48
Perineum	2	0	1	1	0	4
Spine	0	2	1	0	0	3
Upper limbs	13	8	14	7	9	51
Lower limbs	20	29	11	18	15	93

Table 5 and Figure 4 demonstrate the distribution of wounded sites according to residence. The majority of rural residents suffered injuries to their lower limbs, followed by their upper limbs, chest, and abdomen, which accounted for 31/74 (42%), 21 (28.4%), 17 (23%), and 15 (20.3%), respectively. The majority of urban patients presented with lower limbs, followed by the abdomen, upper limbs, and chest, accounting for 61/123 (49.6%), 32 (26%), 29 (23.6%), and 21 (17%), respectively.

Table 5. *Distribution of the injured site by residence.*

Variable	Rural n=74	Urban n=123	Total
Head	1	5	6
Neck	0	6	6
Chest	17	21	38
Abdomen	15	32	47
Perineum	1	3	4
Spine	1	2	3
Upper limbs	21	29	50
Lower limbs	31	61	92

Table 6 summarizes the distribution of injured sites according to occupation. Head injuries predominantly affected pupils and students, each accounting for 2 out of 6 cases (33.3%). Injuries to the lower limb, upper limb, chest, and abdomen occurred in self-employed individuals at rates of 45 out of 92 (49%), 19 out of 51 (37.3%), 21 out of 38 (55.3%), and 21 out of 48 (43.8%), respectively.

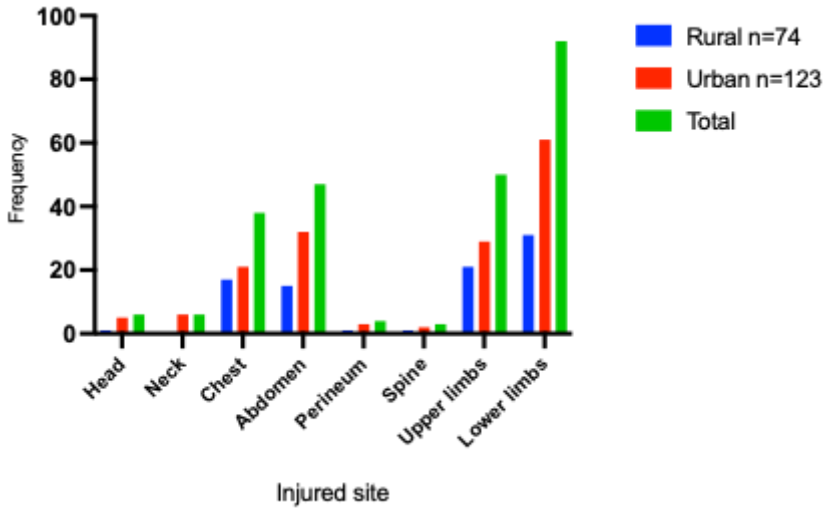

Figure 4. Description of the injured site by the residence.

Table 6. Distribution of the injured site by occupation.

Variable	Pupils	Students	Farmers	Teachers	Self-employed	housewives	drivers	Jobless	Others
Head	2	2	0	0	0	0	0	1	1
Neck	0	2	0	0	3	1	0	0	0
Chest	4	5	1	0	21	4	1	1	1
Abdomen	7	7	2	0	21	5	1	2	2
Perineum	1	1	0	0	2	0	0	0	0
Spine	0	0	0	0	2	0	1	0	0
Upper limbs	5	5	4	1	19	4	3	5	1
Lower limbs	10	14	4	2	45	3	5	4	4

5. Discussion

In the context of armed conflict, injuries manifest not only in corporeal forms but also in the profound psychological scars borne by individuals amidst the turmoil of conflict. This investigation focused exclusively on physical injuries documented at a singular medical facility situated in an area that endured severe armed conflict. Understanding "Wounds in War" necessitates recognizing the intricate nature of injuries sustained during conflict, both visible and hidden, as well as the ongoing need for comprehensive care for those affected by warfare. It is imperative to address these injuries for the rehabilitation of individuals and the reconstruction of communities in the aftermath of conflict. As a result, this research sought to explore the correlation between the sites of injuries and the demographic attributes of civilians impacted during the Sudan conflict from 2023 to 2024.

The results of the current investigation indicated that the majority of victims experienced impacts primarily in the lower limbs, followed by the upper limbs and abdomen. Military weapons predominantly inflict harm upon the upper and lower extremities, resulting in considerable structural disruption associated with these injuries. Comparable observations have been documented in prior studies conducted in Sudan. The lower limb emerged as the most commonly impacted extremity, representing 56% of cases, while the upper limb was predominant in 54.9% of instances [6]. Injuries to the extremities arising from conflict lead to intricate wounds marked by various structural complications and a high likelihood of contamination, posing significant difficulties during the reconstruction process. In settings with limited resources, a customized reconstructive ladder may be utilized in the absence of free flaps, employing pedicled flaps to achieve satisfactory outcomes.

Penetrating abdominal injuries frequently occur in the context of trauma associated with conflict. In Sudan, the incidence of such events has escalated alongside the ongoing armed conflict in North Kordofan state, significantly affecting the healthcare infrastructure in El-Obeid city, the state capital. Surgical intervention represents a legitimate course of action in the context of warfare. The constraints of resource availability heighten the likelihood of adverse outcomes. A study conducted in Sudan during the wartime period revealed that laparotomy constituted the principal surgical intervention required in 98.6% of cases. Postoperative complications comprised peritonitis at a rate of 27.0% and haemorrhage at 25.7%. The mortality rate stood at 13.5%, while a notable 74.3% of patients attained complete recovery. The provision of care faced significant obstacles, notably the constraints of surgical resources (41.9%) and an insufficiency of medical supplies (28.4%) [7].

The results of the present study indicate that the majority of victims were males of a younger age. These findings have been documented in prior research [8-10]. Armed conflict frequently exerts a disproportionate impact on younger males due to a multitude of factors that can be analyzed through diverse social, economic, and cultural perspectives. Comprehending the distinct vulnerabilities encountered by this demographic is essential for formulating effective strategies for peace and recovery. In addition to the tangible consequences of conflict, the persistent state of warfare has engendered a myriad of complex repercussions [11-15].

The findings of the present inquiry revealed that the predominant group affected comprised self-employed individuals and students. This may be attributed to their regular participation in outdoor activities.

In summary, the body regions most impacted during armed conflict include the lower and upper extremities, as well as the abdomen. Individuals engaged in outdoor professions and students are the most affected. Understanding the complexities encountered by these individuals is essential for attaining successful conflict resolution and enabling post-war recovery initiatives.

Abbreviations

SPSS Statistical Package for Social Sciences

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Conflicts of Interest

The authors declare no conflict of interest.

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